show a variation from the general law of decreasing basicity for plutonic intrusions, but this may be explained by the localized character of the phenomena.

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Fertilization and Egg-laying in Microcotyle Stenotomi

Although the process of fertilization of the ovum is readily visible in those animals in which these elements meet outside the body in water, the actual behavior of the internal organs in those other animals where the process occurs within the body is seldom seen. It is for that reason that it seems desirable to describe it as studied in the transparent *Microcotyle Stenotomi.*

Copulation has been carefully observed and graphically described by Zeller in the case of *Polystomum integerrimum,* where the two vaginal orifices are at the lateral margins, but no other description has been found in the literature on the monogenetic trematodes, and in the case of the microcotylinæ is of special interest, since although hermaphrodites they can hardly carry out mutual copulation at the same time, as the vaginal orifice is median and dorsal while the penis is protruded from the ventral side.

Microcotyle Stenotomi, which occurs on the gills of *Stenotomus Chrysops,* is small enough (2.5 mm.) to become quite transparent when slightly compressed by the coverslip. If a number of these worms be placed alive in a watchglass full of sea water some of them will be seen to go into conjugation after certain repeated preliminary touching together of the anterior ends of the two bodies has taken place. In this passing of the anterior part of the body of one over that of the other the greatest acuteness of sensation is shown. However, after a certain amount of friction together, one worm almost spasmodically becomes fastened by its anterior ventral end, where the genital pore is situated, to the corresponding portion of the dorsal surface of the other in the position of the vaginal opening. They are therefore clasped together by the anterior ends, almost at right angles to one another, while still supporting themselves on their footlike sucker discs. Because the cirrus and surrounding genital aperture are generally provided with clusters of small hooks the pair is enabled to keep their position during the act.

The spermatozoa pass through the Y-shaped reservoir of the vitellaria to be stored in the seminal reservoir or spermatheca, whence it is ejected as required. A similar provision exists, as is well known, in many animals of more complete development.

In order to follow the later stages in the process of fertilization the worm must be put in a drop of sea water under the coverslip with a hair beside it to prevent too great crushing by the weight of the coverglass, and to allow of the normal movements of the genitalia. Anteriorly and ventrally is the genital pore through which the uterus opens. On the dorsal surface somewhat behind this is the orifice of the vagina. The ovary is a convoluted tube filled with ova which runs across the middle of the body, turning backward to end in an oviduct, while on each side of the body, occupying most of its cavity, is the vitellarium, giving off ducts which unite in a Y-shaped reservoir in the midline behind the ovary. Testes are present in a great group in the midpart of the body toward the caudal end.

In the ovary the ova are immature at the end of the organ, which is turned to the right; toward the other end, as the oviduct is approached, they become larger and mature. The oviduct may be seen proceeding toward the tip of the Y-shaped vitelline reservoir. Before reaching this it is joined by the duct of a small muscular sac which in this case is kidney-shaped and which is the seminal reservoir. If one is fortunate enough to see an ovum leave the ovary on its way toward the uterus, one can also observe that the seminal reservoir contracts spasmodically and injects a fine jet of opaline fluid into the oviduct toward the oncoming ovum, which on meeting the spermatozoa quickens its motion. It recedes a little, then advances again four or five

times as though to come thoroughly into contact with the seminal fluid. Then it passes quietly along the common duct until that is joined by the Y-shaped duct from which the granular yellowish fluid from the vitellaria is churned, as it were, into the oviduct and comes into contact wth the ovum surrounding and adhering to it. Continuing on its course the ovum passes into the wider ootype. Here by a vermicular moulding process the yolk is arranged round the ovum and the form of the egg begins to appear. From the ootype, when properly shaped, it passes along to the muscular portion of the uterine canal, which receives the openings of the shell gland. In *Microcotyle Stenotomi* the shell gland appears to be formed of a single mass of cells, the duct from which opens by a wide mouth into the uterus at this point. Generally, however, it is arranged as a mantle of cells about the first portion of the uterus opening by numerous perforations from which exude a chitinous fluid which becomes evenly smeared over the surface of the egg and forms the shell. The egg is now completed with the exception of the long chitinous filaments which are formed by the contractions of the uterus on the soft material. The completed egg passes along into the more distal part of the uterus, where it remains until the worm is ready to deposit it. For this purpose it proceeds to prepare by seizing with its anterior or oral suckers a piece of the gills, but in the case observed under the microscope a bit of waste material was fastened upon because it was convenient. The caudal disc of suckers was also fastened to some support, so that the body was slightly extended. Then a waving motion began, the waves traveling toward the anterior part from the caudal end of the body. After this had lasted for a few seconds the worm began to lash itself up and down, still retaining its hold on the débris to assist its muscular exertions. After the first lashing effort a portion of the anterior coiled filament appeared at the genital aperture; after a short rest a further violent expulsive effort occurred and the pointed end of the egg appeared externally. This was followed by another rest and then a still more violent expulsive effort which shot the egg against the waste material, where it remained fastened. The whole process was repeated after another short rest, until five eggs were laid, when a long rest ensued and the observation ended.

The process of laying the eggs occupied, all told, probably not more than a minute, but it was striking to see the display of some sort of intelligence by the worm in preparing for the expulsive efforts by seizing the waste material as a fixed point from which to pull.

Although this process of conjugation, fertilization and egg-laying could be directly observed only in this transparent form, it seems entirely probable that it is the same in all the microcotylidæ.[1]

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ANTHROPOLOGY AT THE CLEVELAND MEETING

THE annual meeting of the American Anthropological Association was held at the Case School of Applied Science, Cleveland, Ohio, December 30, 1912, to January 2, 1913, in affiliation with Section H of the American Association for the Advancement of Science and the American Folk-Lore Society. In the absence of President Fewkes, Drs. Dorsey, Wissler and MacCurdy each presided at the various sessions. President Lomax, of the Folk-Lore Society was also absent, his place being taken by Dr. Charles Peabody, who read the presidential address.

SECTION H

Members of the sectional committee present: G. T. Ladd, E. L. Thorndike, W. V. Bingham, G. G. MacCurdy.

Officers for the Cleveland meeting were named as follows: member of the council, Dr. Clark Wissler; member of the general committee, Dr. Charles Peabody. Sectional offices were filled by the nomination and election by the general committee of Professor W. B. Pillsbury, University of Michigan, as vice-president for the ensuing year; Professor George Grant MacCurdy, Yale

[1] The above observations were made at the Laboratory of the U. S. Fish Commission at Woods Hole, Mass.